Exhibit 1

Table I-1
CWLDLP: Producers' production capabilities, by country and specifications

Country/firm	Production process	Size (*inches OD*)	Wall thickness (*inches*)	Length (*feet*)	API specificiations/ grades
UNITED STATES:					
American	Continuous-line (CL) ERW	18 - 24	.219 - .625	25 - 85	API 5L B, X42-X80
Berg	Pyramid-rolling SAW	24 - 64	.312 - 1.375	20 - 40	API 5L B, X42-X70, PSL 1 & 2
Bethlehem	UOE SAW	20 - 42	.281 - 1.000	25 - 81	API 5L A, B, X42-X70
Napa	UOE SAW	18 - 42	.250 - 1.000	40 -80	API 5L B, X42-X80
Saw	UOE SAW	24 - 48	.250 - 1.000	36 - 80	API 5L A, B, X42-X80
Stupp	CL ERW	18 - 24	.250 - .562	20 -85	API 5L B, X42-X70
US Steel	CL ERW	18 - 20	.188 - .406	16 - 80	API 5L B, X42-X70
JAPAN:					
Kawasaki	CL ERW	18 - 26	.219 - .688	18 - 66	API 5L B, X42-X70
	UOE SAW	20 - 64	.250 - 1.75	40 - 60	API 5L B, X42-X80
Nippon	ERW	18 - 24	.18 - .87	18 - 60.2	API 5L B, X42-X80 and above
	UOE SAW	18 - 56	.25 - 1.57	29.6 - 60.9	API 5L B, X42- X80 and above
NKK	ERW	18 - 24	.109 - .752	20 - 60	API 5L B, X42-X80
	SAW	18 - 56	.236 - 2.0	20 - 60	API 5L B, X42-X80 (X100)
Sumitomo	ERW	18 - 24	.20 - .75	40 - 60	API 5L B, X42- X80 and above
	UOE SAW	18 - 56	.25 - 1.575	40 - 60	API 5L B, X42- X80 and above
MEXICO:					
PMT	SAW	18 - 48	.25 - 1.125	39 - 41	API 5L B, X42-X70, PSL1 & 2
Procarsa	ERW	18 - 20	.25 - .50	20 - 60	API 5L B, X42-X65
Tubacero	CL ERW	18 - 42	.219 - 1.125	20 - 50	API 5L B, X42-X80
	Pyramid-rolling SAW	20 - 48	.219 - 1.0	20 - 50	API 5L B, X42-X80
Tuberia Laguna	CL ERW	18 - 24	.25 - .50	20 - 40	API 5L B, X42-X60
Tubesa	Spiral SAW	20 - 80	.312 - 1.0	20 - 50	API 5L B, X42-X65

Source: Compiled from data submitted in response to Commission questionnaires and available company websites.

1 of 1 DOCUMENT

Offshore

January, 2000

SECTION: GULF OF MEXICO; Pg. 34

LENGTH: 4083 words

HEADLINE: US Gulf has 112 discoveries in water depths greater than 1,500 ft

BYLINE: Marshall DeLuca, International Editor

HIGHLIGHT:
Producers post record 17 strikes in 1999

BODY:

The one constant during the 1998-1999 industry economic downturn was deepwater action. When budget cuts were made, they were made from the shelf seaward. As a result, deepwater activity in the Gulf of Mexico in 1999 remained strong despite other areas feeling the weak market crunch.

Seventeen discoveries were notched in the past year in water depths greater than 1,500 ft, which marks the greatest number of discoveries in any single year. The following shows the number of deepwater discoveries reported by year: 1999-17; 1998-10; 1997-16; 1996-8; 1995-5; 1994-4; 1993-3; 1992-0; 1991-4; 1990-1; and 1980 and previous-15.

From 1993, the deepwater discovery rate showed a steady increase until 1997 doubled the previous year's numbers, which was coincidentally at the same time prices rebounded. However, as commodity prices dropped in 1998, deepwater activity followed. But, 1999 discoveries continued to climb despite a weak price scenario. This can be tied to the number of new deepwater units entering operations.

Operators have committed to long-term agreements with the drilling contractors, and as the rigs hit the water, both the contractor and the operator have been keen on putting them to work and paying off the large capital investment. So, as the deepwater fleet continues to expand well into the next few years, exploration activity (and results) will continue to rise.

Development

While discoveries were at record levels in the Gulf of Mexico, development activity remained slow. A number of discoveries were shelved and deemed non-commercial at the low prices. Others were pushed back indefinitely.

Two such casualties came from Texaco, which announced that the McKinley and Fuji prospects, while having good oil shows, were not of the commercial quantity for the company to develop. These were not reported as being the result of low oil prices, but rather because the size did not warrant further Texaco investment. However, these could feasibly be picked up by a smaller company that will not require the field size that Texaco does to turn a profit.

With prices rebounding and a strong first quarter expected, it would not be unreasonable to expect some operators to re-evaluate some of these projects and begin looking at new development schemes.

Another key factor causing low development activity, and a factor that will extend well into 2000, are the mega-mergers. Major producers such as BP Amoco, ExxonMobil, and TotalFinaElf are still trying to iron out the details of their new combined companies. This has resulted in a slowdown while decisions are being made on what assets to keep and what to let go. Activity from these players is expected to remain low for a while longer until these issues are decided.

This does translate to a chance for increased activity from the independents. When the mega-merged super majors begin dropping some of these properties, the independents are likely to snatch several of them up. And with the independents' notorious ability to act quickly, activity may pick up considerably.

In fact several of the discoveries in 1999 were made by the independents. Vastar recorded two, Kerr-McGee discovered three, and Murphy and Marathon each had one.

Production

Twenty-seven of the 112 discoveries in deepwater are in production. In 1999, seven fields came onstream. Included in 1999 were some very big names -- BP Amoco's Marlin Field, Texaco's Gemini Field, Chevron's Genesis, and Shell brought Macaroni and Ursa onstream. This year 14 fields are planned to come onstream. Included are some major projects such as Exxon's Diana/Hoover, Texaco's Petronius, EEX's Llano, and Shell's Europa.

Deepwater survey

Of the 112 discoveries made in Gulf of Mexico water depths greater than 1,500 ft, 92 have been given prospect names, and the remaining 20 have yet to be named. A total of 83 are in planning stages, which for lack of a better term, means simply that it is not onstream yet. It could mean that the operator is either still considering producing the discovery or is about to bring the field onstream. A total of 27 are in production and two of the discoveries, Fuji and McKinley, were recently determined by operator Texaco as not viable.

Offshore Magazine's US Gulf Deepwater Survey lists each field by name, location (block number), water depth, operator (partner), stage of development, and production type, year of discovery, year of first production, estimated or proven reserves in millions of bbl oil equivalent (BOE), and peak/test production (oil/gas). A dash indicates that the information was unavailable at press time.

Each listing has a number that corresponds to the accompanying map. Numbers on the map in red indicate that the field is in production; numbers in yellow indicate the field is in the planning stage. Fields beyond the 1,500 ft contour are listed on a separate chart.

1999 deepwater discoveries (>1,500 ft)>100> >101>

Name	Area & Block No.	Water depth (ft)	Operator (Partner)
Aconcagua	Miss. Canyon 305	7,073	Elf (Mariner, Pioneer)
Camden Hills	Miss. Canyon 348	7,200	Marathon (WI, Total)
Crazy Horse	Miss. Canyon 776, 777, 778	6,000	BP Amoco (Mobil)
Holstein	Green Canyon 644, 645	4,000	BP Amoco (Shell)
Horn Mountain	Miss. Canyon 127	5,400	Vastar (Oxy)
K2	Green Canyon 562	3,900	Conoco (Spirit Energy)
Mad Dog	Green Canyon 825, 826	6,734	BP Amoco (Unocal, BHP)
Magnolia	Garden Banks 783, 740, 784	4,700	Conoco (Ocean Energy)
Matterhorn	Miss. Canyon 243	2,835	Elf
Medusa	Miss. Canyon 582	2,100	Murphy (British-Borneo, Callon)
Mirage	Miss. Canyon 941	3,927	Vastar (Spirit)
Nansen	East Breaks 602	3,680	Kerr-McGee (Ocean Energy)
North Boomvang	East Breaks 643	3,450	Kerr-McGee (Reading & Bates Development, Ocean Energy)
Oregeno	Garden Banks 559	3,393	Shell
Typhoon	Green Canyon 237	2,000	Chevron (BHP)
West Boomvang	East Breaks 642	3,500	Kerr-McGee (Reading & Bates Development, Ocean Energy)
Unnamed	Miss. Canyon 942	3,930	Shell (Total)

Name	Date	Well results
Aconcagua	Mar-1999	200 gross ft
Camden Hills	Aug-1999	200 ft gas pay
Crazy Horse	Jul-1999	1 billion bbl

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Name	Date	Well results estimated reserves
Holstein	Jul-1999	-
Horn Mountain	Aug-1999	285 net ft of pay
K2	Sept-1999	-
Mad Dog	Apr-1999	300 net ft of pay
Magnolia	May-1999	150 -- 200 net ft of pay
Matterhorn	Aug-1999	370 gross ft, 6,640 b/d
Medusa	Oct-99	120 ft of total pay in two intervals
Mirage	Mar-1999	300 net ft of pay, 100 million bbl estimated reserves
Nansen	Oct-99	140 of gas condensate pay
North Boomvang	Sept-1999	-
Oregeno	Apr-1999	-
Typhoon	Feb-1999	310 net ft of pay
West Boomvang	Nov-1999	66 ft of pay
Unnamed	Apr-1999	200 net ft

1999 Deepwater fields onstream

Name	Operator	Location	Production rate	Production Type
Allegheny	British -Borneo	Green Canyon 253, 254, 297, 298	25,000 b/d/ 35 MMcf/d	TLP
Angus	Shell	Green Canyon 113	40,000 b/d/ 60 MMcf/d	Subsea
Gemini	Texaco	Miss. Canyon 292	2-3,000 b/d/ 150-200 MMcf/d	Subsea
Genesis	Chevron	Green Canyon 205, 160, 161	55,000 bbl/ 72 MMcf/d	Spar

Name	Operator	Location	Production rate	Production Type
Macaroni	Shell	Garden Banks 602	35,000 b/d/ 65 MMcf/d	Subsea
Marlin	BP Amoco	Viosca Knoll 915	40,000 b/d/ 250 MMcf/d	TLP
Ursa	Shell	Miss. Canyon 809	150,000 b/d/ 400 MMcf/d	TLP

Deepwater Discoveries in the US Gulf of Mexico (>1,500 ft)>100> >101>

Prospect name		Area & block no.	Water depth (ft)
NAMED PROSPECTS			
1	Aconcagua	Miss. Canyon 305	7,073
2	Allegheny	Green Canyon 253, 254, 297, 298	3,186
3	Angus	Green Canyon 113	2,045
4	Anstey (East) *	Miss. Canyon 607	6,590
5	Ariel **	Miss. Canyon 429	6,274
6	Arnold	Ewing Bank 963	1,752
7	Atlantis	Green Canyon 698, 699, 700, 742, 743, 744	6,133
8	Auger	Garden Banks 426	2,864
9	Baha	Alaminos Canyon 600	7,620
10	Baldpate	Garden Banks 260	1,609
11	Bison	Green Canyon 166	2,359
12	Black Widow	Ewing Bank 966	1,848
13	Boomvang (East)	East Breaks 688	3,737
14	Boomvang (North)	East Breaks 654	3,688
15	Brutus	Green Canyon 158	2,877
16	Camden Hills	Miss. Canyon 348	7,200
17	Cardamon	Garden Banks 471	2,873
18	Conger	Garden Banks 215	1,500

Prospect name		Area & block no.	Water depth (ft)
NAMED PROSPECTS			
19	Cooper	Garden Banks 388	2,163
20	Coulomb	Miss. Canyon 657	7,520
21	Crazy Horse	Miss. Canyon 776, 777, 778	6,000
22	Crosby	Miss. Canyon 899	4,392
23	Diamond	Miss. Canyon 445	2,095
24	Diana	East Breaks 945	4,679
25	Diana (South)	Alaminos Canyon 65	4,679
26	Europa	Miss. Canyon 934, 935, 890, 891	3,889
27	Fourier **	Miss. Canyon 522	6,929
28	Fuji	Green Canyon 506	4,253
29	Gemini	Miss. Canyon 292	3,667
30	Genesis	Green Canyon 205, 160, 161	2,599
31	Glider	Green Canyon 248	3,300
32	Gomez	Miss. Canyon 755	3,010
33	Grand Canyon	Green Canyon 141	1,715
34	Habanero	Garden Banks 341	2,000
35	Herschel South	Miss. Canyon 520	6,739
36	Holstein	Green Canyon 644, 645	4,000
37	Hoover	Alaminos Canyon 25, 26	4,785
38	Horn Mountain	Miss. Canyon 127	5,400
39	Jolliet	Green Canyon 184	1,722
40	K2	Green Canyon 562	3,900
41	Kepler **	Miss. Canyon 383	5,759
42	King	Miss. Canyon 84	5,315
43	King	Miss. Canyon 764	3,285

Prospect name NAMED PROSPECTS		Area & block no.	Water depth (ft)
44	King Kong	Green Canyon 472	3,817
45	King's Peak # 1	Desoto Canyon 133	6,530
46	King's Peak # 2	Miss. Canyon 217	6,608
47	Knight	Garden Banks 372	1,740
48	Leo	Miss. Canyon 502, 503, 546	2,496
49	Llano	Garden Banks 386	2,700
50	Macaroni	Garden Banks 602	3,689
51	Mad Dog	Green Canyon 825, 826	6,734
52	Madison	Alaminos Canyon 24	4,851
53	Magnolia	Garden Banks 783, 740, 784	4,700
54	Marlin	Viosca Knoll 915	3,238
55	Mars	Miss. Canyon 807	2,860
56	Marshall	East Breaks 949	4,376
57	Matterhorn	Miss. Canyon 243	2,835
58	MC 243	Miss. Canyon 243	3,100
59	McKinley	Green Canyon 416	4,019
60	Medusa	Miss. Canyon 582	2,100
61	Mensa	Miss. Canyon 687	5,327
62	Metallica *	Miss. Canyon 911	7,000
63	Mickey	Miss. Canyon 211	4,356
64	Mirage	Miss. Canyon 941	3,927
65	Morpeth/Klamath	Ewing Bank 965, 921	1,709
66	Nakika **	Miss. Canyon 383, 429, 522	5,759
67	Nansen	East Breaks 602	3,680

	Prospect name	Area & block no.	Water depth (ft)
NAMED PROSPECTS			
68	Narcissus	Miss. Canyon 630	4,250
69	Neptune	Viosca Knoll 825, 826, 869, 870	1,866
70	Neptune *	Atwater Valley 575	6,162
71	Nile	Viosca Knoll 914	3,534
72	Nirvana *	Miss. Canyon 162	3,517
73	North Boomvang	East Breaks 643	3,450
74	North Marlin	Viosca Knoll 827	2,521
75	Northwestern	Garden Banks 200	1,750
76	Oregeno	Garden Banks 559	3,393
77	Petronius	Viosca Knoll 786	1,751
78	Pluto	Miss. Canyon 673, 674, 717, 718	2,828
79	Pompano II	Miss. Canyon 28	1,865
80	Popeye	Green Canyon 116	2,068
81	Poseiden *	Green Canyon 691	4,489
82	Ram Powell	Viosca Knoll 956	3,244
83	Rocky	Green Canyon 110	1,621
84	Sorano	Garden Banks 516	3,153
85	Tahoe	Viosca Knoll 783	1,500
86	Tahoe Southeast	Viosca Knoll 827	1,770
87	Troika	Green Canyon 244	2,681
88	Typhoon	Green Canyon 237	2,000
89	Ursa	Miss. Canyon 809	3,885
90	West Boomvang	East Breaks 642	3,500
91	Zeus	Miss. Canyon 941	3,905
92	Zia	Miss. Canyon 496	1,780

Prospect name NAMED PROSPECTS UNNAMED PROSPECTS		Area & block no.	Water depth (ft)
93	(un)	Atwater Valley 8	3,135
94	(un)	Ewing Bank 1006	1,884
95	(un)	Garden Banks 254	1,920
96	(un)	Garden Banks 259/216	1,946
97	(un)	Garden Banks 302	2,411
98	(un)	Garden Banks 543	2,000
99	(un)	Green Canyon 37	2,024
100	(un)	Green Canyon 72	1,655
101	(un)	Green Canyon 82	2,400
102	(un)	Green Canyon 92	1,640
103	(un)	Green Canyon 153	1,500
104	(un)	Green Canyon 181	1,550
105	(un)	Green Canyon 228	1,638
106	(un)	Green Canyon 236	2,000
107	(un)	Green Canyon 296	3,920
108	(un)	Miss. Canyon 441	1,520
109	(un)	Miss. Canyon 442	1,531
110	(un)	Miss. Canyon 443	2,095
111	(un)	Miss. Canyon 837	3,900
112	(un)	Miss. Canyon 942	3,930

Prospect name NAMED PROSPECTS		Operator (Partner)	Status (Production type)
1	Aconcagua	Elf (Mariner, Pioneer)	Planning
2	Allegheny	British-Borneo (EEX)	Producing (TLP/SS)
3	Angus	Shell (Marathon)	Producing (SS)
4	Anstey (East) *	BP Amoco	Planning

Prospect name NAMED PROSPECTS		Operator (Partner)	Status (Production type)
5	Ariel **	Shell (BP Amoco)	Planning
6	Arnold	Marathon	Producing (SS)
7	Atlantis	BP Amoco (BHP)	Planning
8	Auger	Shell (BP Amoco)	Producing (TLP)
9	Baha	Shell	Planning
10	Baldpate	Amerada Hess	Producing (CT)
11	Bison	ExxonMobil	Planning
12	Black Widow	Mariner (British-Borneo, Santa Fe Snyder)	Planning (SS)
13	Boomvang (East)	Kerr-McGee (Reading & Bates Development, Ocean Energy)	Planning (SS)
14	Boomvang (North)	Kerr-McGee (Reading & Bates Development, Ocean Energy)	Planning
15	Brutus	Shell (ExxonMobil)	Planning (TLP)
16	Camden Hills	Marathon (WI, Total)	Planning
17	Cardamon	Shell	Producing
18	Conger	Amerada Hess (Shell, Kerr-McGee)	Planning (SS/FIX)
19	Cooper	EEX (BP Amoco)	Producing (FPS)/ Decommissioning
20	Coulomb	Shell	Planning
21	Crazy Horse	BP Amoco (Mobil)	Planning (SPR)
22	Crosby	Shell (BP Amoco)	Planning
23	Diamond	Kerr-McGee	Producing (SS)
24	Diana	ExxonMobil (BP Amoco)	Planning (SPR)
25	Diana (South)	ExxonMobil	Planning (SS)

Prospect name		Operator (Partner)	Status (Production type)
NAMED PROSPECTS			
26	Europa	Shell (BP Amoco, Conoco)	Planning (SS)
27	Fourier **	Shell (BP Amoco)	Planning
28	Fuji	Texaco (Shell, Statoil)	No planned development
29	Gemini	Texaco (Chevron)	Producing (SS)
30	Genesis	Chevron (ExxonMobil, TotalFina)	Producing (SPR)
31	Glider	Shell	Planning (TLP)
32	Gomez	UPRC	Planning (SPR/TLP)
33	Grand Canyon	Conoco	Planning
34	Habanero	Shell (Callon, Murphy)	Planning
35	Herschel South	BP Amoco (Shell)	Planning
36	Holstein	BP Amoco (Shell)	Planning
37	Hoover	ExxonMobil (BP Amoco)	Planning (FPS)
38	Horn Mountain	Vastar (Oxy)	Planning
39	Jolliet	Conoco	Producing (TLP)
40	K2	Conoco (Spirit Energy)	Planning
41	Kepler **	Shell (BP Amoco)	Planning
42	King	BP Amoco	Planning (SPR)
43	King	Vastar (Shell, BP Amoco)	Planning (SS)
44	King Kong	Conoco (British-Borneo, Shell)	Planning (SS)
45	King's Peak # 1	BP Amoco	Planning (SS)
46	King's Peak # 2	BP Amoco	Planning (SS)
47	Knight	Santa Fe Snyder	Planning
48	Leo	British-Borneo (Spirit, Petrobras, Snyder)	Planning
49	Llano	EEX (Enterprise,	Planning (SS)

Prospect name NAMED PROSPECTS		Operator (Partner)	Status (Production type)
		PanCanadian, Mobil)	
50	Macaroni	Shell	Producing (SS)
51	Mad Dog	BP Amoco (Unocal, BHP)	Planning
52	Madison	ExxonMobil	Planning (SS)
53	Magnolia	Conoco (Ocean Energy)	Planning
54	Marlin	BP Amoco	Producing (TLP)
55	Mars	Shell (BP Amoco)	Producing (TLP/SS)
56	Marshall	ExxonMobil	Planning (SS)
57	Matterhorn	Elf	Planning
58	MC 243	Conoco	Planning
59	McKinley	Texaco (Spirit Energy)	No planned development
60	Medusa	Murphy (British-Borneo, Callon)	Planning
61	Mensa	Shell	Producing (SS)
62	Metallica *	BP Amoco	Planning
63	Mickey	ExxonMobil (BP Amoco)	Planning (SS)
64	Mirage	Vaster (Spirit)	Planning
65	Morpeth/Klamath	British-Borneo	Producing (TLP/SS)
66	Nakika **	Shell (BP Amoco)	Planning (FPS)
67	Nansen	Kerr-McGee (Ocean Energy)	Planning
68	Narcissus	Texaco	Planning
69	Neptune	Kerr-McGee	Producing (SPR)
70	Neptune *	BP Amoco	Planning
71	Nile	BP Amoco	Planning
72	Nirvana *	BP Amoco	Planning

Prospect name		Operator (Partner)	Status (Production type)
NAMED PROSPECTS			
73	North Boomvang	Kerr-McGee (Reading & Bates Development, Ocean Energy)	Planning
74	North Marlin	Shell (CNG, Murphy)	Planning
75	Northwestern	Amerada Hess (Kerr-McGee, Petrobras)	Planning (SS)
76	Oregeno	Shell	Planning
77	Petronius	Texaco (Marathon)	Planning (CT)
78	Pluto	Mariner (Burlington)	Planning (SS)
79	Pompano II	BP Amoco (Kerr-McGee)	Producing (SS)
80	Popeye	Shell (CNG, Mobil, BP Amoco)	Producing (SS)
81	Poseiden *	BP Amoco	Planning
82	Ram Powell	Shell (ExxonMobil, BP Amoco)	Producing (TLP)
83	Rocky	Shell	Producing (SS)
84	Sorano	Shell	Planning (SS)
85	Tahoe	Shell (Murphy)	Producing (SS)
86	Tahoe Southeast	Shell	Producing (SS)
87	Troika	BP Amoco (Shell, Marathon)	Producing (SS)
88	Typhoon	Chevron (BHP)	Planning
89	Ursa	Shell (ExxonMobil, BP Amoco, Conoco)	Producing (TLP)
90	West Boomvang	Kerr-McGee (Reading & Bates Development, Ocean Energy)	Planning
91	Zeus	ExxonMobil	Planning
92	Zia	Shell (Ocean Energy, Spinnaker, British-Borneo)	Planning

UNNAMED PROSPECTS

Prospect name		Operator (Partner)	Status (Production type)
NAMED PROSPECTS			
93	(un)	Shell	Planning
94	(un)	Walter	Planning (SS)
95	(un)	Chevron	Planning
96	(un)	Amerada	Planning (CT)
97	(un)	Conoco	Planning
98	(un)	Marathon	Planning
99	(un)	British-Borneo	Planning
100	(un)	Mobil	Planning (SS)
101	(un)	Kerr McGee	Planning
102	(un)	Texaco	Planning
103	(un)	Marathon	Planning
104	(un)	Amoco	Planning
105	(un)	Texaco	Planning
106	(un)	Marathon	Planning
107	(un)	Shell	Planning
108	(un)	Enserch (Agip, Fina)	Producing (SS)
109	(un)	Enserch	Producing (SS)
110	(un)	Walter	Planning (SS)
111	(un)	Walter	Planning (SS)
112	(un)	Shell (Total)	Planning

Prospect name		Year of discovery	Year of first production
NAMED PROSPECTS			
1	Aconcagua	1999	--
2	Allegheny	1996	1999
3	Angus	1997	1999
4	Anstey (East) *	--	--
5	Ariel **	1997	--

Prospect name		Year of discovery	Year of first production
NAMED PROSPECTS			
6	Arnold	1996	1998
7	Atlantis	1998	--
8	Auger	1987	1994
9	Baha	1996	--
10	Baldpate	1991	1998
11	Bison	--	--
12	Black Widow	1998	2000
13	Boomvang (East)	1988	--
14	Boomvang (North)	1997	--
15	Brutus	1989	2001
16	Camden Hills	1999	--
17	Cardamon	1995	1997
18	Conger	1998	--
19	Cooper	1989	1995
20	Coulomb	1988	--
21	Crazy Horse	1999	--
22	Crosby	1997	--
23	Diamond	1988	1994
24	Diana	1991	2000
25	Diana (South)	1996	2000
26	Europa	1994	2000
27	Fourier **	1987	--
28	Fuji	1995	--
29	Gemini	1995	1999
30	Genesis	1996	1999
31	Glider	1996	2000

Prospect name		Year of discovery	Year of first production
NAMED PROSPECTS			
32	Gomez	1997	2001
33	Grand Canyon		
34	Habanero	1998	--
35	Herschel South	1997	--
36	Holstein	1999	--
37	Hoover	1997	2000
38	Horn Mountain	1999	--
39	Jolliet	1981	1989
40	K2	1999	--
41	Kepler **	1997	--
42	King	1993	2001
43	King	1997	2000
44	King Kong	1997	2000
45	King's Peak # 1	1993	2001
46	King's Peak # 2	1994	2000
47	Knight	--	--
48	Leo	1998	--
49	Llano	1998	2000
50	Macaroni	1995	1999
51	Mad Dog	1999	--
52	Madison		
53	Magnolia	1999	--
54	Marlin	1993	1999
55	Mars	1989	1996
56	Marshall	--	--
57	Matterhorn	1999	--

Prospect name		Year of discovery	Year of first production
NAMED PROSPECTS			
58	MC 243	1990	2000
59	McKinley	1998	--
60	Medusa	1999	--
61	Mensa	1987	1997
62	Metallica *	--	2004
63	Mickey	1991	--
64	Mirage	1999	--
65	Morpeth/Klamath	1997	1998
66	Nakika **	1997	2000
67	Nansen	1999	--
68	Narcissus	1997	--
69	Neptune	1998	1997
70	Neptune *	--	2001
71	Nile	1997	--
72	Nirvana *	--	2001
73	North Boomvang	1999	--
74	North Marlin	1998	--
75	Northwestern	1998	2001
76	Oregeno	1999	--
77	Petronius	1995	2000
78	Pluto	1996	2000
79	Pompano II	1985	1996
80	Popeye	1985	1996
81	Poseiden *	--	--
82	Ram Powell	1989	1997
83	Rocky	1994	1996

Prospect name		Year of discovery	Year of first production
NAMED PROSPECTS			
84	Sorano	1997	2001
85	Tahoe	1984	1994
86	Tahoe Southeast	1996	1996
87	Troika	1994	1997
88	Typhoon	1999	2001
89	Ursa	1991	1999
90	West Boomvang	1999	--
91	Zeus	--	--
92	Zia	1998	--
UNNAMED PROSPECTS			
93	(un)	--	--
94	(un)	1997	1998
95	(un)	--	--
96	(un)	--	--
97	(un)	1991	--
98	(un)	--	--
99	(un)	--	--
100	(un)	--	--
101	(un)	--	--
102	(un)	--	--
103	(un)	--	--
104	(un)	--	--
105	(un)	--	--
106	(un)	--	--
107	(un)	--	--
108	(un)	1986	1993

Prospect name		Year of discovery	Year of first production
NAMED PROSPECTS			
109	(un)	--	--
110	(un)	--	1999
111	(un)	--	1999
112	(un)	1999	--

Prospect name		Reserves - Estimated (Proven) (In Millions BOE)	Peak/Test Production Oil/Gas
NAMED PROSPECTS			
1	Aconcagua	--	--
2	Allegheny	52	25,000 b/d/35 MMcf/d
3	Angus	64	40,000 b/d/60 MMcf/d
4	Anstey (East) *	--	--
5	Ariel **	--	--
6	Arnold	25	17,000 b/d
7	Atlantis	--	--
8	Auger	(186.5)	100,00 b/d/300 MMcf/d
9	Baha	50	--
10	Baldpate	100-200	50,000 b/d/150 MMcf/d
11	Bison	--	--
12	Black Widow	--	--
13	Boomvang (East)	35	--
14	Boomvang (North)	35-45	--
15	Brutus	100-150	--
16	Camden Hills	--	--
17	Cardamon	35	--
18	Conger	50-100	--
19	Cooper	(66)	12,000 b/d
20	Coulomb	50	--
21	Crazy Horse	1,000	--

Prospect name		Reserves - Estimated (Proven) (In Millions BOE)	Peak/Test Production Oil/Gas
NAMED PROSPECTS			
22	Crosby	--	--
23	Diamond	(6)	--
24	Diana	350	4,800 b/d/2.6 MMcf/d
25	Diana (South)	--	--
26	Europa	160	60,000 b/d/45 MMcf/d
27	Fourier **	--	--
28	Fuji	50	--
29	Gemini	250-300	2-3,000 b/d/ 150-200 MMcf/d
30	Genesis	(123)	55,000 bbl/72 MMcf/d
31	Glider	100-150	--
32	Gomez	100-140	40,000 b/d
33	Grand Canyon		
34	Habanero	--	--
35	Herschel South	50	
36	Holstein	--	--
37	Hoover	100	--
38	Horn Mountain	--	--
39	Jolliet	(57)	--
40	K2	--	
41	Kepler **	--	--
42	King	--	--
43	King	--	--
44	King Kong	250	--
45	King's Peak # 1	250	--
46	King's Peak # 2	250	--

Prospect name		Reserves - Estimated (Proven) (In Millions BOE)	Peak/Test Production Oil/Gas
NAMED PROSPECTS			
47	Knight	--	--
48	Leo	--	--
49	Llano	1,000	--
50	Macaroni	78	35,000 b/d/65 MMcf/d
51	Mad Dog	--	--
52	Madison		
53	Magnolia	--	--
54	Marlin	100	40,000 b/d/250 MMcf/d
55	Mars	(166)	140,000 b/d/140 MMcf/d
56	Marshall		--
57	Matterhorn	--	--
58	MC 243	--	--
59	McKinley	130-200	--
60	Medusa	--	--
61	Mensa	(142)	300 MMcf/d
62	Metallica *	--	--
63	Mickey	100-200	--
64	Mirage	100	--
65	Morpeth/Klamath	77	35,000 b/d/36 MMcf/d
66	Nakika **	--	--
67	Nansen	--	--
68	Narcissus	--	--
69	Neptune	(67)	30,000 b/d/30 MMcf/d
70	Neptune *	100	--
71	Nile	50	--

Prospect name		Reserves - Estimated (Proven) (In Millions BOE)	Peak/Test Production Oil/Gas
NAMED PROSPECTS			
72	Nirvana *	--	--
73	North Boomvang	--	--
74	North Marlin	--	--
75	Northwestern	125	75-85 MMcf/d
76	Oregeno	--	--
77	Petronius	80-100	--
78	Pluto	20-25	--
79	Pompano II	(193)	--
80	Popeye	(60)	9,000 b/d/160 MMcf/d
81	Poseiden *	--	--
82	Ram Powell	(252)	70,000 b/d/260 MMcf/d
83	Rocky	(7)	6,900 b/d
84	Sorano	50	--
85	Tahoe	(106)	300 MMcf/d
86	Tahoe Southeast	120	235 MMcf/d
87	Troika	200	80,000 b/d/140 MMcf/d
88	Typhoon	--	--
89	Ursa	(112)	150,000 b/d/400 MMcf/d
90	West Boomvang	--	--
91	Zeus	--	--
92	Zia	--	--
UNNAMED PROSPECTS			
93	(un)	--	--
94	(un)	--	--
95	(un)	--	--
96	(un)	--	--

Prospect name	Reserves - Estimated (Proven) (In Millions BOE)	Peak/Test Production Oil/Gas
NAMED PROSPECTS		
97 (un)	--	--
98 (un)	--	--
99 (un)	--	--
100 (un)	--	--
101 (un)	--	--
102 (un)	--	--
103 (un)	--	--
104 (un)	--	--
105 (un)	--	--
106 (un)	--	--
107 (un)	--	--
108 (un)	38	--
109 (un)	--	--
110 (un)	--	--
111 (un)	--	--
112 (un)	--	200 net ft

* Reported by MMS as discoveries, however BP Amoco has not announced as a commercial discovery.

** Ariel, Fourier, and Kepler may be developed as part of the Nakika development.

GRAPHIC: Map, Deepwater discoveries in the Gulf of Mexico (greater than 1,500 ft); Picture, Marlin TLP.

LOAD-DATE: February 11, 2000

Oil & Gas Journal

November 6, 2000
Correction Appended

SECTION: SPECIAL REPORT; Deepwater Gulf of Mexico; Pg. 74

LENGTH: 2068 words

HEADLINE: Gulf of Mexico deepwater future;
looks bright as new plays result in major discoveries

BYLINE: Robert H. Peterson, Paul J. Post, Minerals Management Service, New Orleans

BODY:

Deepwater wells, those in greater than 1,000 ft of water, are now producing more than 700,000 bo/d on the U.S. Gulf of Mexico (GOM) Outer Continental Shelf (OCS).

For the first time deepwater oil production exceeds that of GOM shelf and slope wells. This milestone represents the emergence of a bright future for the deepwater GOM.

This production increase and anticipated future increases are coming from hydrocarbon trends and plays that were conceived, leased, and drilled from the mid-1980s through the late-1990s. These plays are far from mature, and analysis of field-size distribution data shows that many additional field discoveries are expected in these plays.

Looking to future potential GOM hydrocarbon reserve additions, the US Minerals Management Service (MMS) is encouraged by the leasing, drilling, and recent discoveries in several new hydrocarbon trends and plays. Chris Oynes, regional director of the Gulf of Mexico OCS Region, recently stated when referring to the deepwater GOM, "Its future looks bright, as many new geologic trends are only now seeing the first exploratory drilling." n1

Deepwater explosion

From 1996 through 1999, an explosion of lease activity occurred in the deepwater GOM (Fig. 1).

Several positive factors, i.e., the Deepwater Royalty Relief Act, improving oil prices, and several key deepwater discoveries, combined to stimulate leasing and exploration.

The bars in Fig. 1 illustrate the number of leases receiving bids in the deepwater GOM from 1974 to 2000 in 2-year periods. The solid red curve is the volume of hydrocarbons discovered in each of these periods. These volumes include MMS reserve and resource estimates as well as those announced in company press releases and other public sources.

This curve shows an increase in discovered volumes in the late 1980s and a second, larger increase in the late 1990s. The dashed green line relates the discovered hydrocarbon volumes to the date the lease was acquired rather than the year of discovery.

This line shows that many of the large discoveries in the late 1990s are on leases acquired in the mid and late 1980s. Consequently, we have yet to see the impact of successful exploratory drilling on the large number of leases awarded during 1996-99.

Nascent plays

Many of these post-1995 leases are in untested or very sparsely tested plays.

Fig. 2 shows in green both current active leases in the GOM and blocks that received bids in Sale 177 (not all of these blocks have been awarded at the time of this writing.)

The outlines of four significant new plays and trends, as well as the proposed Sale 181 Eastern GOM sale area, are also shown.

Obviously, it is difficult to predict with a high degree of certainty the exploration targets a company has in mind when bidding on a lease. Additionally, a lease may have potential targets in more than one hydrocarbon play. Fig. 2 shows the high number of leases in the new play and trend areas. It is important to note that three of these plays and trends extend into the Sale 181 area.

Four plays or trends have received the most interest because of recent but limited drilling and/or active leasing. Fig. 3 outlines these new trends and plays in the Western and Central GOM. These include the following:

1. The Mississippi Fan Fold Belt Play (MFFB) that now has five announced discoveries in predominantly Miocene reservoirs. This play may be divided into two regions:

* Compressional folds partially or wholly in front of the Sigsbee escarpment. Discoveries announced in this region include Atlantis (Green Canyon 699), Neptune (Atwater Valley 575), and Mad Dog (Green Canyon 826).

Significant hydrocarbon volumes have been encountered on these large structures. For example, although appraisal drilling is in the early stages, Spirit Energy believes the Mad Dog discovery has " . . . gross resource potential within the drilling unit to be in excess of 400 MMboe and as much as 800 MMboe." n2

Another example is from BHP's press release: "The Broken Hill Proprietary Co. Ltd. (BHP) today announced further results from the Atlantis 2 appraisal well confirming a major oil accumulation with a multi-hundred million barrel resource potential. . . . " n3

* Compressional folds that occur beneath the Sigsbee Salt Canopy (SSC). Correctly imaging these subsalt structures is a major challenge requiring the industry to develop and use a number of prestack, depth-migrated seismic techniques. Announced discoveries at K2 (Green Canyon 562) and Champlain (Atwater Valley 63) show that successful exploration of the fold belt structures beneath the SSC is possible. These discoveries open a very large area north of the Sigsbee Escarpment to future exploration.

2. Another play with virtually no exploration drilling is the Perdido Fold Belt Play. The play is similar to the MFFB Play in that it consists of very large compressional fold belt structures. However, the plays differ in age of the structures and targeted reservoirs. One discovery, BAHA (Alaminos Canyon 600), has been drilled, but the well failed to reach its primary Mesozoic objectives.

A second exploration well is being drilled at Alaminos Canyon 557. The results of this well may have a significant impact on future exploration activity in this play. Like the MFFB Play, the compressional folds extend a considerable distance landward beneath the SSC. The play is less heavily leased than the MFFB because of greater water depths over much of its extent.

3. Tertiary Fan and "Buried Hill" plays are located seaward of both the Sigsbee Escarpment and fold belt plays. These plays are undrilled but have undergone recent leasing.

Geophysical mapping shows a number of possible exploration targets. These include large abyssal fans, structural drape closures over buried hills, the buried hills themselves, local sedimentary buildups (reefs?), and detrital deposits related to the buried hills. These targets are conceptual and await future drilling.

4. The most talked about recent discovery in the deepwater GOM is in the middle of a well-leased area, the Crazy Horse (Mississippi Canyon 778) discovery.

"With estimated recoverable oil of at least 1 billion barrels of oil equivalent (boe), it is the biggest discovery ever in the Gulf deepwater." n4

Crazy Horse is one of three discoveries on "turtle structures." "Pluto" (aka BS&T) (Mississippi Canyon 718) and "Mensa" (Mississippi Canyon 731) are the other two.

The Crazy Horse and Pluto discoveries are partially covered by shallow salt canopies. Recent leasing and high bid amounts suggest that industry recognizes additional targets on similar turtle structures.

Sale 181 is an undrilled deepwater area in the Eastern Planning area.

Recent seismic interpretation shows that trap types in this region are analogous to those found in the west-adjacent Central GOM area. Consequently, the sale area's hydrocarbon potential is considered to be very similar to that area.

Future reserves

Oil & Gas Journal, November 6, 2000

Recent discoveries in lightly drilled plays will add significant hydrocarbon volumes to GOM hydrocarbon reserves.

How significant might these discovery volumes be? One responsibility of MMS is to provide an estimate of future hydrocarbon reserves expected to be discovered in the GOM.

To support this estimate, MMS has completed a detailed analysis on all productive hydrocarbon plays in the GOM. A "play" is a group of genetically related reservoirs defined on the basis of depositional style, age, and structural or trap style. A single field may produce from more than one play.

This analysis of producing plays has been published in the two-volume "Atlas of Northern Gulf of Mexico Gas and Oil Reservoirs, 1997" (Atlas). n5 n6 An updated version of the atlas with production data to Jan. 1, 1999, is to be published on CD-ROM early in 2001. The atlas provides an important knowledge base of existing productive hydrocarbon plays (65 plays producing in 984 fields).

These data are then incorporated into the MMS's "Assessment of Conventionally Recoverable Hydrocarbon Resources of the Gulf of Mexico and Atlantic Outer Continental Shelf," n7 also known as the National Assessment (NA). The atlas documents existing production and reserves in the GOM; the NA estimates future hydrocarbon discovery volumes from established, frontier, and conceptual plays.

The NA is based on the productive hydrocarbon plays documented in the atlas. Boundaries for each play are first established by using reserve and production information from the atlas. Then, data from unsuccessful wells and the most recent exploratory wells are incorporated.

The result is a map of the geologic limits of the play, and an estimate of the number and size of future discoveries in the play. Therefore, the NA provides an estimate of hydrocarbon volumes yet to be discovered in existing productive plays. The NA also uses analog plays from the atlas and other data sources to provide realistic models for important parameters used in estimating hydrocarbon volumes for plays with no production or limited production history.

Analysis of play and field data strongly suggests a lognormal distribution of discovery sizes. This assumption is the basis for the MMS projections of field sizes. The MMS's latest NA will be published on CD-ROM in early 2001.

Positive outlook

Fig. 4 demonstrates the "bright future" of the deepwater GOM. Instead of an analysis of a single play, this example is of fields in a water depth range of 2,625-5,250 ft (800-1,600m.)

Fig. 4 is a semi-log plot of the expected distribution of all fields, both discovered and predicted to be discovered, in this water depth range. Known fields are shown by a square. The mean size of predicted future discoveries is shown by a horizontal bar, with the 5th and 95th percentile expectation shown by a vertical bar.

This example shows that 127 new field discoveries with expected reserves (mean estimate) totaling more than 20 billion BOE occur in this water depth range.

Most of these discoveries are anticipated to occur in several relatively new plays where a limited number of wells have already resulted in potentially large discoveries that have significant positive impact on the estimated reserve volumes. The geologic limits of these potential play areas are very extensive, and a large undrilled lease inventory provides the opportunity to achieve the projected results.

Industry's first response to these new discoveries has been increased leasing through these plays, followed by exploratory drilling. Fig. 5 shows the locations of applications for a permit to drill filed from 1999 through August 2000 for exploratory wells in greater than 3,000 ft of water.

As a appraisal wells increase the reserves of known discoveries, and as drilling results in new discoveries, this reserve projection moves from forecast to reality. The future of the deepwater GOM may be very bright indeed.

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CORRECTION-DATE: **November 27, 2000**

CORRECTION:

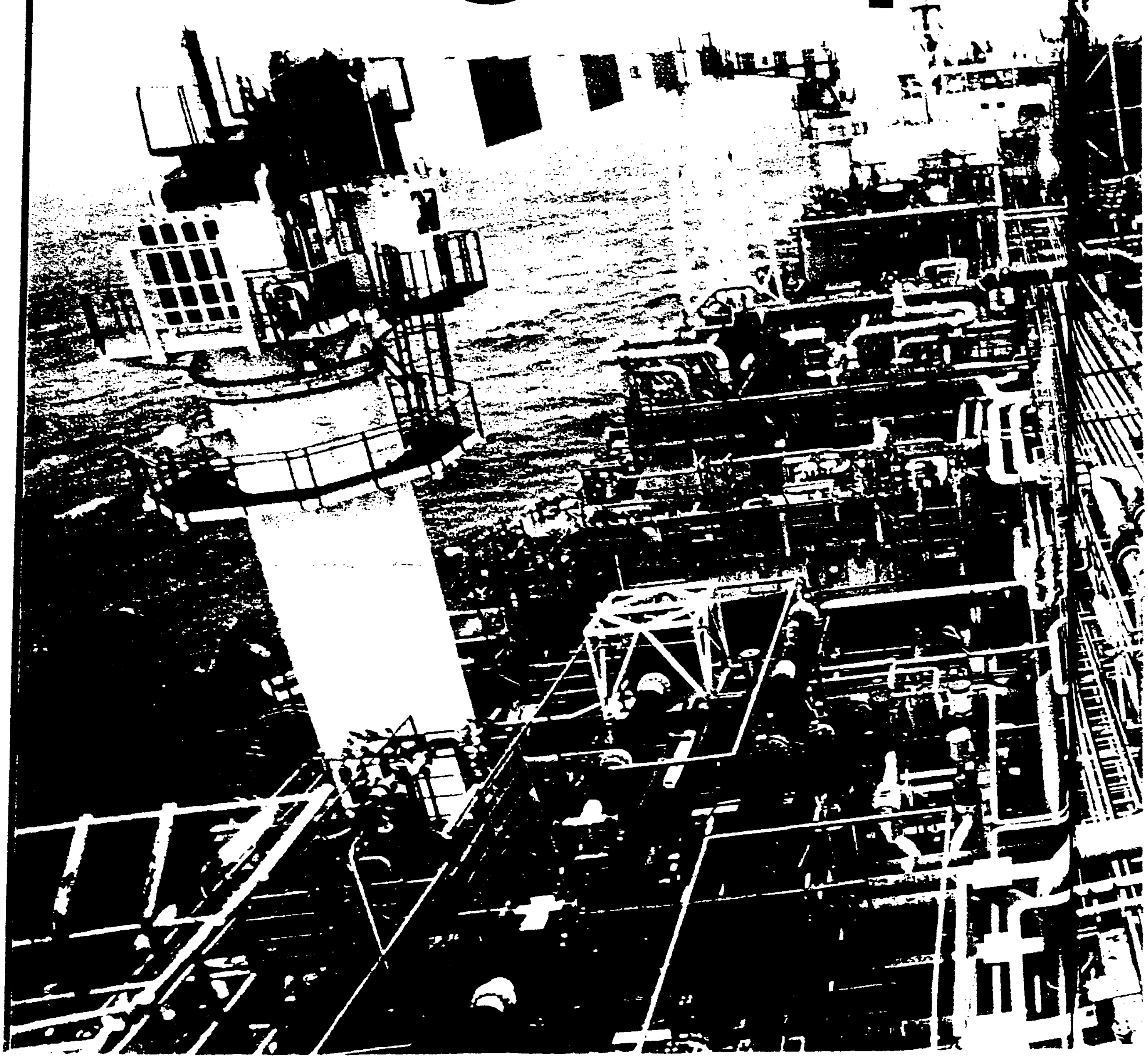
An error appeared in the article, "Gulf of Mexico deepwater future looks bright as new plays result in major discoveries" (OGJ, Nov. 6, 2000, p. 74). The dashed green line on Fig. 1 referred to in the text on p. 74 is actually a solid double blue line on Fig. 1 on p. 75.

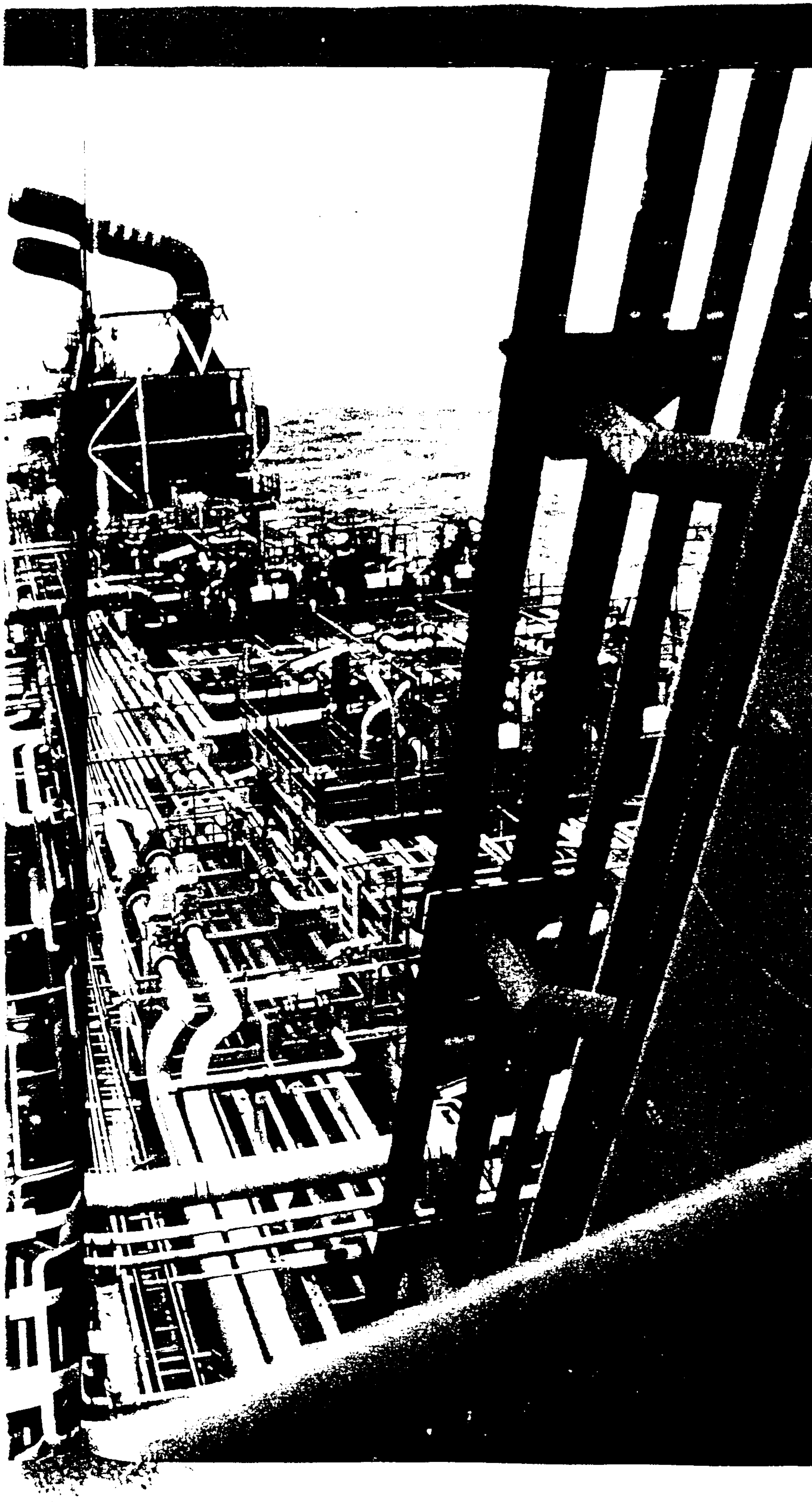
GRAPHIC: Picture, no caption; Figure 1, DEEPWATER LEASE ACTIVITY, DISCOVERED VOLUMES *; Figure 2, AREAS OF THREE IMPORTANT DEEPWATER PLAYS; Figure 3, NEW DEEPWATER DISCOVERIES AND PLAYS; Figure 4, FIELD RANK PLOT FROM 1998 NATIONAL ASSESSMENT **; Figure 5, APPLICATIONS FOR PERMITS TO DRILL IN 3,000 FT OF WATER

Exhibit 4

COVER STORY BP Amoco

Going Deep





HOW SIR JOHN BROWNE TURNED BP AMOCO INTO THE HOTTEST PROSPECT IN THE OIL PATCH.

By Daniel Fisher

ON A NOTORIOUSLY VIOLENT patch of the Atlantic Ocean north of Scotland and 100 miles west of the Shetland Islands, where winds howl at 50 miles per hour and waves can run 100 feet high, a brutish red vessel rolls in a mounting breeze. The ship, named the *Schiehallion* after a mountain on the Scottish coast, is the only visible sign of what lies 1,200 feet below: a 500-million-barrel oilfield that BP Amoco has discovered and developed. Equipped with a turntable mechanism at its bow, the floating production platform can swivel a full 360 degrees in treacherous winds while pumping more than 100,000 barrels of oil a day. At current prices *Schiehallion* is dropping $1 billion a year into BP's bank account.

A decade ago this project would have been technologically and financially absurd. At a cost of $1.2 billion, it still exceeds the reach of all but the biggest oil companies. But for BP Amoco, such deepwater oilfields are the only chance of finding enough crude to replace declining reserves in less remote parts of the world. The company is in an urgent race to control the last giant sources of oil in the waning days of the petroleum era.

For BP Amoco's soft-spoken chief executive, Sir John Browne, deep water offers the prospect of the largest untapped reserves and the lowest-cost means of extraction. It could keep the

TANDEM OPERATION: THE *SCHIEHALLION* TRAILED BY A SHUTTLE TANKER, WHICH DELIVERS OIL TO THE MAINLAND.

company safely afloat even if oil prices, currently $30 a barrel, fall by half.

London-based BP Amoco once confined its efforts to buying small stakes in the deepwater forays led by bigger rivals. But in recent years the company has quietly stolen the lead in this expensive game, moving ahead of ExxonMobil Corp. and Royal Dutch/Shell Group. BP Amoco (which will drop "Amoco" from its name later this year) has spent the past decade buying up exclusive drilling rights to undersea acreage in the world's most promising deepwater regions, setting up an assembly-line process to find new reserves, build rigs and get the oil out.

By 2005 BP expects to pull 1.3 million barrels of oil and their equivalent of gas a day from fields lying in waters more than 1,000 feet deep in places including offshore Trinidad, the North Sea and the Gulf of Mexico—25% of its worldwide production, up from only 6% now. The total could climb dramatically as BP completes similar projects in Brazil and Angola *(see map, p. 116)*. "This demonstrates what organic growth means," Browne says. "We found the resources ourselves, we're developing them ourselves and we have a lot of legs. It goes and goes and goes."

The deep-sea plunge is the crucial element to achieving Browne's promise of turning in earnings growth of 10% a year even as revenue grows only half as fast. Hitting that target requires trimming per-barrel costs by 3% a year, and the key to doing that is technology. And nowhere in the oil patch is technology as challenging as in the deep waters of the Atlantic, the Gulf of Mexico and elsewhere *(see diagram, p. 114)*.

If Browne is right, BP, now the world's third-largest oil company with $148 billion in sales and almost $12 billion in net income last year, could pass Shell to become the number two oil company and pose a more potent threat to number one ExxonMobil. BP needs some good news: Its stock is down 11% over the past eight months, compared with a 9.5% rise in the S&P Oil Index (BP trades as an ADR on the New York Stock Exchange). BP shares are valued at only 16.7 times trailing earnings, compared with ExxonMobil's multiple of 18.

But Browne's deepwater push carries big risks, ranging from steep upfront costs to devastating human error and corrupt foreign governments. Drilling a deepwater well costs $50 million or more, compared with only $1 million onshore. At the sea floor, ice plugs can form in pipelines exposed to the near-freezing temperatures, forcing the owner to rent a drilling rig at $200,000 a day to fix the clog. Mistakes can be brutally expensive. Poorly engineered wells can get clogged with sand, requiring intervention at $5 million a pop. In 1998 contractors on Texaco's Petronius project accidentally dropped a 3,600-ton deck module into the Gulf of Mexico. Today the $70 million platform still languishes under 1,700 feet of water, too deep to be recovered.

In some regions the challenge is complicated by politics. After BP and two rivals paid $870 million in "signature bonuses" to Angola's government to win deepwater concessions in 1999, human-rights activists complained that the cash went to fund the long war against UNITA rebels. And some doubters wonder whether BP can really deliver. Investors should be wary until Browne proves his deepwater gamble has paid off, says Merrill Lynch analyst Jonathan Wright, who questions whether BP deepwater results will come in time to replace diminishing production of existing fields.

Exploiting the deep was a typically bold move by Browne, a lifelong BP employee whose father was a BP engineer, as well. Named chief executive in 1995, Sir John kicked off a spate of oil mergers in 1998 with his $48 billion acquisition of Amoco, later cutting annual operating expenses by $5 billion. Exxon responded by acquiring Mobil. Browne next scooped up Arco for $27 billion, making BP the largest U.S. producer of natural gas—in time to see the price of its product triple. Smaller outfits like Chevron and Texaco are still playing catch-up.

Browne, 53, is a donnish, Cambridge-educated oil engineer who loves the opera, smokes Cuban cigars and collects Mapplethorpe photographs ("flowers," he is quick to point out) and 18th-century English furniture. His father, Edmund, worked at BP for ten years and died in 1980. His mother, Paula, was a Romanian survivor of the Auschwitz death camp in World War II; she lived with him until she died last year. (Browne has never married.)

While studying physics at Cambridge in 1966, Browne apprenticed at his dad's company. After graduating in 1969, the younger Browne joined BP full time as an engineer at Prudhoe Bay in Alaska, where BP had just discovered a massive, 14-million-barrel oilfield.

Prudhoe Bay taught Browne the distinction between technical and financial success—and the value of blind luck.

JONATHAN OLLEY / NETWORK / SABA FOR FORBES (PREVIOUS PAGE)

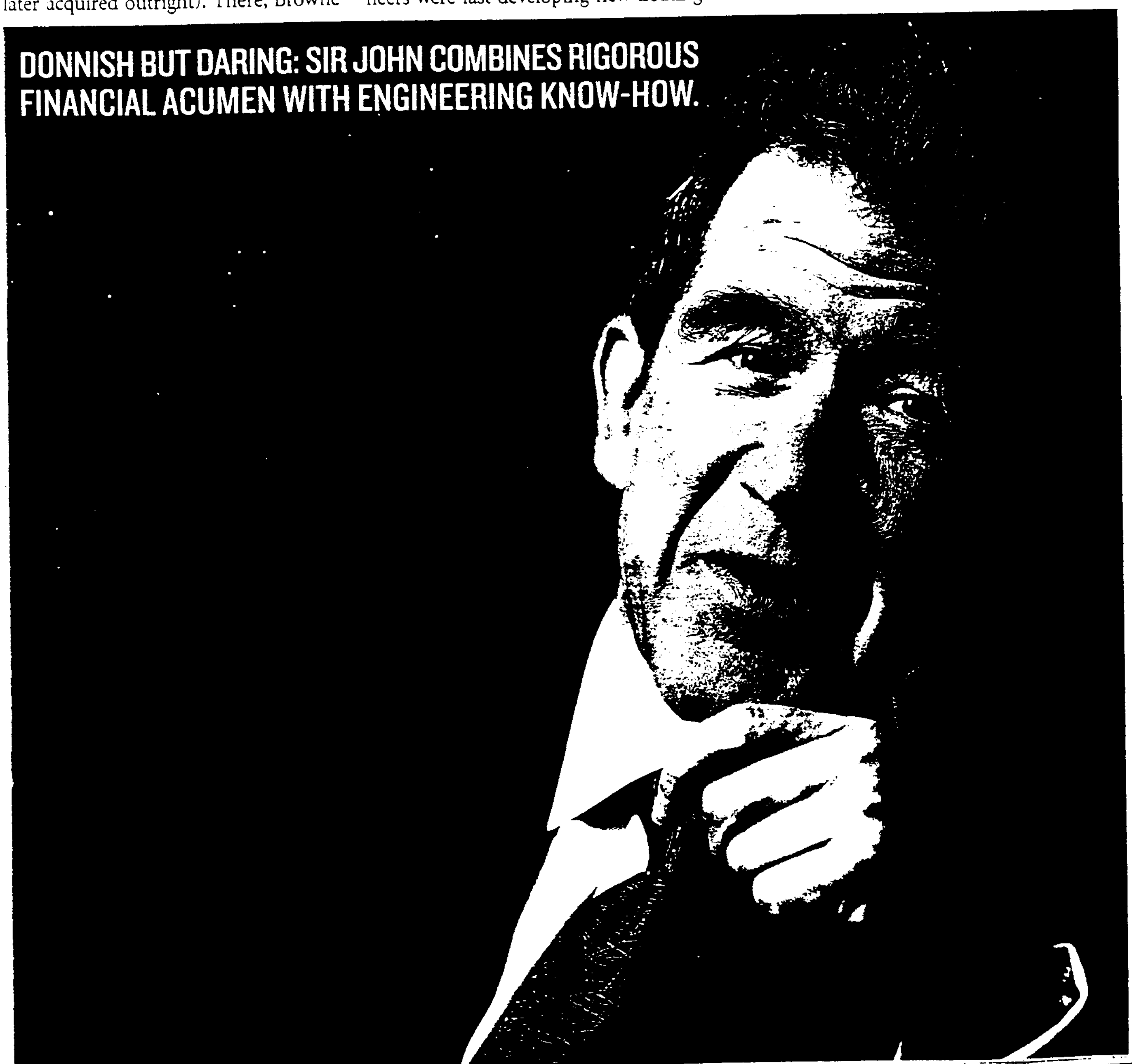
When BP and its partners built a pipeline to carry the crude 800 miles overland to a tanker depot in Valdez, project costs rose tenfold to $9 billion. Fortunately, "the price of oil went up by a factor of five," Browne says. "Based on $1.95 oil, it would have been pretty tough."

By 1980 Browne had earned a master's in business at Stanford while working for BP in San Francisco. He moved back to the company's base in London and held a series of finance jobs, welding his knowledge of petroleum engineering to the discipline of return on investment. In 1986 he became chief financial officer of BP's 55%-owned Sohio unit (which it later acquired outright). There, Browne began to take a harder look at the promise of deepwater drilling, largely out of necessity: He took charge of exploration and determined that Sohio's oil projects outside of Alaska were a mishmash of expensive properties that would never yield a proper profit.

At the time Jack E. Golden, then a staff geologist and now head of deepwater exploration for BP, had a theory that massive oil deposits lay just beyond the Continental Shelf in the Gulf of Mexico, in waters 1,000 feet deep or more. That was beyond the reach of conventional drilling platforms, which stand on steel legs anchored to the sea floor. But engineers were fast developing new floating platforms and undersea equipment to exploit these deeper reserves.

Intrigued, Browne diverted Sohio's entire $50-million-a-year exploration budget to the unproven deep, even though other oil companies were still making good money on the Shelf. "The key was to take a position in advance of the then-fashionable theory," says Browne. "It wasn't a 'bet-the-company' strategy, but it was clear that if it didn't work, our position in North America would be limited to Alaska."

The gamble worked. Rather than punching in wells immediately, BP bought a share of two Shell projects, Ursa and Mars, which turned out to



DONNISH BUT DARING: SIR JOHN COMBINES RIGOROUS FINANCIAL ACUMEN WITH ENGINEERING KNOW-HOW.

MARK JENKINSON FOR FORBES

The Delicate Art of Sucking Up

Extracting crude oil from deposits under 6,000 feet of water is one of the most complex projects around, on a par with building a jet airliner. Hardly surprising that oil executives are looking to the high-tech Boeing 777 as the model for doing things cheaper, faster and better.

In both cases engineers rely on computer-aided design, intricate planning and layers of digital controls to make everything work. To develop a deepwater oil field, geologists first sift through terabytes of data collected by undersea seismic devices. Only the U.S. Navy uses more sophisticated computer techniques.

Next, geologists and petroleum engineers huddle in a "hive," or 3-D imaging room, to identify promising geological formations and plan the trajectory of the well. Using Linux-based servers working in parallel, they generate a computer model of how a drill bit must twist and turn to hit one or more formations as much as 30,000 feet below the sea floor.

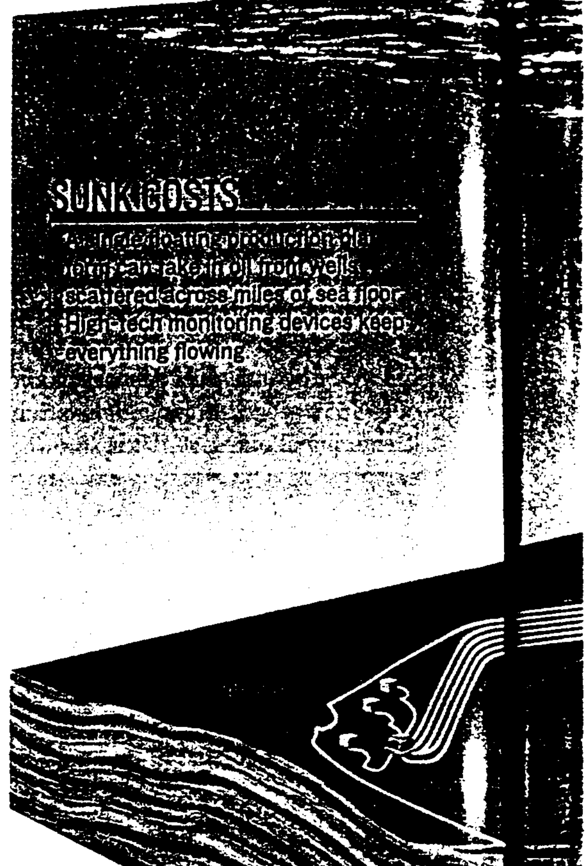
With plan in hand the oil company rents a drill ship at $250,000 a day to punch in exploratory wells. The 700-foot drill ship is equipped with computer-controlled thrusters, or swiveling propellers, that can keep it in position in any kind of inclement weather, up to a hurricane.

To drill the well, engineers have devised an ingenious system of hollow "riser pipe" that creates a hermetic seal between the well opening on the sea floor and the ship swaying 6,000 feet above. Inside the riser pipe is a space about 18 inches in diameter, large enough to hold the spinning drill pipe and bit as well as to allow the return flow of drilling fluid. The whole construction is similar to an oil well on land, with the weight of the drilling fluid designed to contain the geological pressures deep in the ground. But to protect against uncontrolled releases, or blowouts, a valve assembly must be lowered to the sea floor.

Scuba divers can't work at 6,000 feet, where the water temperature is close to freezing and pressure exceeds 2,600 pounds per square inch. So everything must be done with remote-controlled robots—equipped with cameras and powerful lights—that install the blowout preventers, submersible pumps and other devices to manage the flow of oil and water on the sea floor.

Once the wells are completed, often over 50 square miles or more of the ocean bottom, they are connected by flexible hoses to a floating production platform on the surface. Some, called spars, resemble giant fishing bobs 700 feet long and are anchored to the bottom with massive chains. The $500 million spar takes in the natural gas, crude and water flowing from the wells and separates them with filters and centrifugal spinners, offloading the oil and gas to undersea pipelines or a waiting tanker.

To manage the field over its 20-year life span oil companies borrowed technology from the aerospace and telecommunications industries. Fiber-optic links feed back constant temperature and pressure data, while sensors the size of a dime determine if water has infiltrated the surrounding rock, threatening oil production. Technology borrowed from a satellite manufacturer yields valves that can operate reliably for years at pressures as high as 18,000 pounds per square inch, so reservoir managers can direct the flow of oil and water inside the formations.



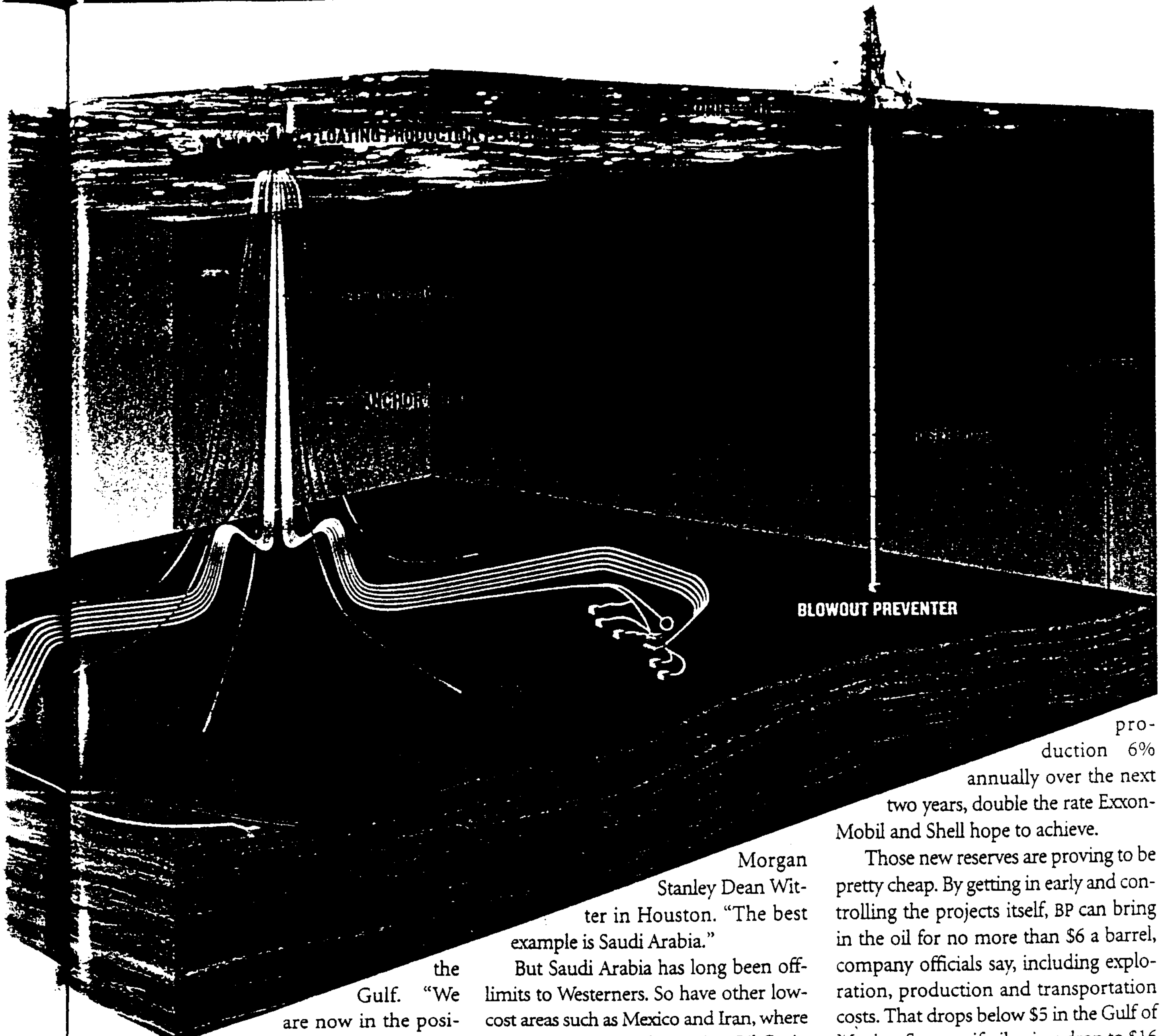
The ultimate purpose of all this technology is to protect an asset that, at a cost of more than $1 billion, must produce every last drop of oil it can. —D.F.

hold some 500 million barrels apiece. Having proved Golden's hunch correct, BP then leapfrogged Shell and its other competitors and went farther out into the Gulf, into zones where conventional seismic analysis couldn't actually detect whether there was oil in the ground.

The risk was higher, because only a $50 million well would determine success. But by going farther out, BP found it could assemble large tracts of 9-square-mile blocks at the minimum lease bid of $150,000, compared with current prices as high as $20 million.

BP hit pay dirt in 1995 with its Neptune well, 6,200 feet under in the Gulf of Mexico. Then in 1999 BP found Crazy Horse, with an estimated 1.5 billion barrels lying 6,000 feet below, a field that is expected to produce wells tapping more than 20,000 barrels a day by 2005, 20 times the average in shallower portions of the Gulf. Some analysts think BP's Mad Dog, Holstein and Atlantis fields hold another 2 billion barrels or more.

Now Shell is rapidly falling behind BP in water depths exceeding 2,000 feet. While Shell is widely believed to control more acreage worldwide, BP holds far more of the estimated future reserves in



the Gulf. "We are now in the position where we own 30% to 40% of the discovered reserve base in the deepwater Gulf," says BP's Golden, compared with 25% for Shell. "We managed to come from nowhere over the course of the decade."

Deepwater fields require $1 billion or more to develop—many times the cost of an onshore patch and almost as much as a semiconductor plant. But engineered right, deep water yields higher returns than many onshore projects because the fields are compact and easily drained. "Anytime you find a lot of oil in a small place, the economics are fantastic," says Douglas Terreson, managing director at Morgan Stanley Dean Witter in Houston. "The best example is Saudi Arabia."

But Saudi Arabia has long been off-limits to Westerners. So have other low-cost areas such as Mexico and Iran, where BP got its start as Anglo-Persian Oil Co. in 1908 with the first commercial oil strike in the Middle East. To replace earlier finds oil companies moved offshore, where continent-draining rivers like the Mississippi and the Congo have been depositing petroleum-forming sediments for millions of years.

BP also is the only company with interests in all three of the deepwater tracts where oil has been found near Angola. Off the coast of Brazil, it has leased 15,000 square miles—as much acreage as its vast holdings in the North Sea—and hopes to extract billions of barrels of crude. With the new fields, BP aims to boost production 6% annually over the next two years, double the rate ExxonMobil and Shell hope to achieve.

Those new reserves are proving to be pretty cheap. By getting in early and controlling the projects itself, BP can bring in the oil for no more than $6 a barrel, company officials say, including exploration, production and transportation costs. That drops below $5 in the Gulf of Mexico. So even if oil prices drop to $16 a barrel from their current $30, BP is left with a gross profit of $10 a barrel.

Deepwater oil "improves the financial characteristics of the whole business," says Golden. BP's production costs are at just 18% of revenue, versus 23% at ExxonMobil and 19% at Shell, says Prudential Securities analyst Michael Mayer. That lead should only widen. BP's return on investment in exploration and production could increase to 18.6% next year from 13.6% in 1999, mostly due to cheap reserves, says Morgan Stanley's Terreson. "One of the things BP hasn't gotten credit for is how successful they've

THE DEEPWATER WORLD, ACCORDING TO BP AMOCO

been with the drill bit," he says.

No one knows how much oil is left to be found in the Gulf of Mexico. So far the discoveries are tracking the production curve of the Continental Shelf, where 40 billion barrels have been located since drilling began in the late 1940s. With 10 billion barrels discovered in waters deeper than 2,500 feet thus far, that means another 30 billion barrels may be hiding out there. "Three times since I joined BP there has been a terrific buzz about the company: the North Sea, Prudhoe Bay—and now this," says Adrian Clark, a technical expert in the upstream group, who joined in 1970. "There's the sense we're sitting on something huge."

Roger Anderson, a geophysicist and director of the Energy Research Center at Columbia University's Lamont-Doherty Earth Observatory, says the discoveries may have only begun. Below the sands BP is drilling now, he says, lies an extension of the massive Pozo Rico, an older carbonate formation that extends into the water and was discovered in Mexico at the turn of the century. "You want to know the size of it, look at Pemex's reserves, not BP's," he says. The state-owned Mexican oil company claims reserves of 25 billion barrels; BP pegs its oil supply at 14 billion barrels.

Similarly massive fields are believed to be waiting off the coasts of Brazil and Angola. As in the Gulf, the oil deposits were created during a period of flourishing plant life 80 million years ago, when rivers draining Africa and South America dumped sediments into the narrow and shallow sea then separating the two continents. Poor water circulation meant the organic material was covered before it could decompose, and it eventually was transformed into oil and natural gas.

Getting at the oil can be tricky, and not just because it lies under as much as 30,000 feet of water and rock. In the Gulf most of the oil is hidden under thick layers of salt that blur conventional seismic images, requiring fancy supercomputer-driven images to decipher what is present *(see box, p.114)*. Once oil is found, BP is extremely careful in planning how to extract it. It has set up an assembly line of rig builders, engineers and computer scientists to bring its deepwater projects online quickly and cheaply.

Before a major well is drilled or a platform is built, key employees gather in the "hive," a $500,000 room for viewing 3-D images generated by a Silicon Graphics computer. The hive allows collaboration by geologists, engineers and drillers, who used to work in isolation. They often walk out of a two-hour meeting with a drilling plan, a process that once took weeks. BP saved enough on one well to buy 20 hives to equip all of its major offices. The goal, Browne says, is to get as much upfront cost out as possible to achieve an annual return on investment of at least 15%, assuming $16-a-barrel oil.

"Every business is a margin business—you always have to balance unit production against unit costs," Browne lectures. "If you ever forget that, you will build the greatest projects, get the greatest production—and get no profit."

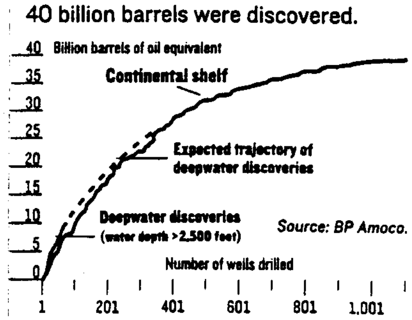
It was Browne's familiarity with the economics of billion-dollar projects that landed him on the board of Intel, where he reviews similar expenditures in the high-tech realm. Intel Chairman Andy Grove, who recruited Browne as a director in 1997, says the BP chief "asks solid questions" in daylong meetings Browne often attends via transatlantic videoconference from his office in London. "We understand each other well," Grove says. "True for him, true for us."

Browne is trying to keep BP a few paces ahead in the energy race, in part by developing nonpetroleum fuel sources such as hydrogen-powered fuel cells and solar panels for the day when the world finally runs out of fossil fuel. BP's new logo, a green sun, and its Web site, populated by what look like refugees from a Benetton ad, help reinforce the image of the company as the environment's best friend. But for the foreseeable future, Browne will be judged on how much oil he can find—and at what price.

Browne, who was knighted in 1998, is up for the challenge. "In the end, it's what we prove we can do and not what we say we can do," he says, "and so far the record's been okay." **F**

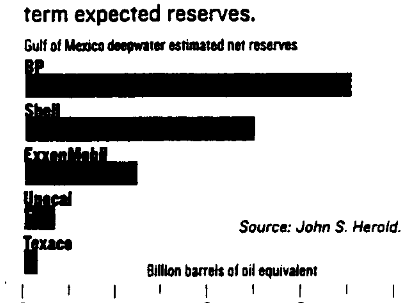
GREAT EXPECTATIONS

With fewer than 100 wells drilled, the deepwater Gulf of Mexico is tracking the pattern of shallower regions where 40 billion barrels were discovered.



PULLING AHEAD

BP Amoco has grabbed the lead in the deepwater Gulf by leasing undersea tracts covering almost 40% of near-term expected reserves.



LISA BRAIMAN (MAP)

Exhibit 5

Mardi Gras Transportation System Inc.

Gulf of Mexico Mississippi Canyon
Southern Green Canyon

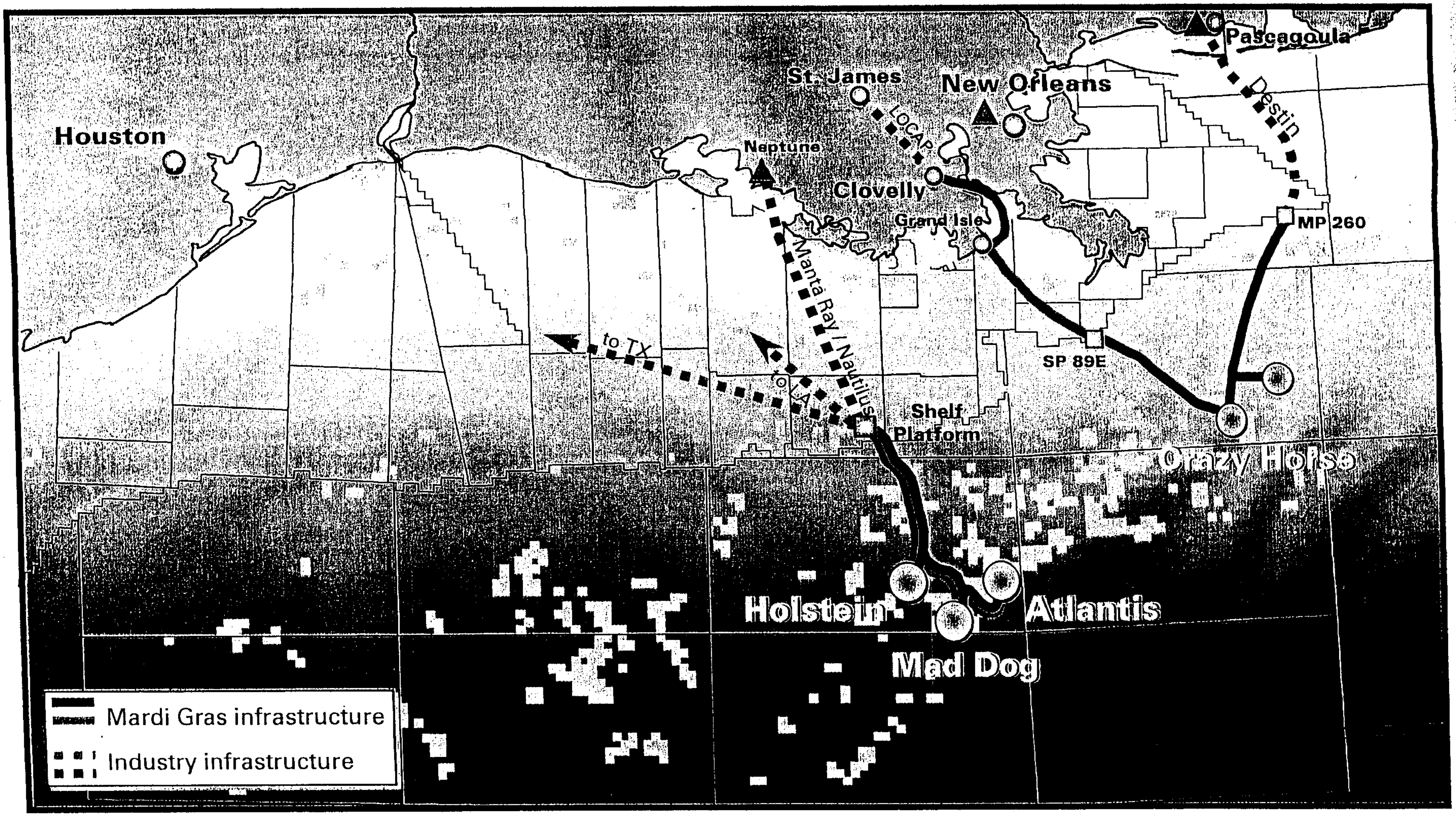
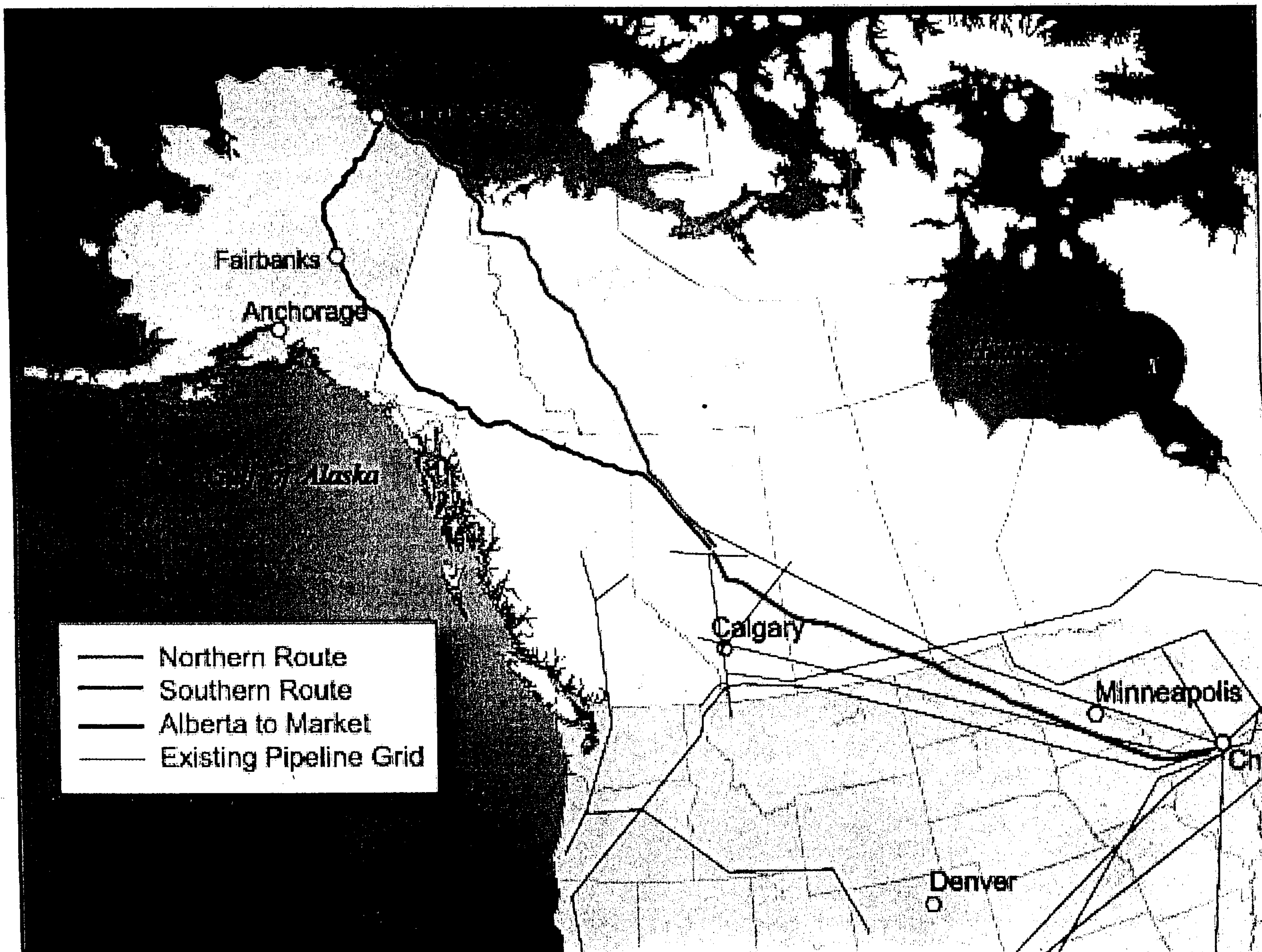


Exhibit 6



bp ExxonMobil PHILLIPS 66